PETROLEUM UNDERGROUND STORAGE TANK SYSTEM FACILITY CLASSIFICATION OUTLINE

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PETROLEUM UNDERGROUND STORAGE TANK SYSTEM
FACILITY CLASSIFICATION OUTLINE

This document shall be used, in accordance with Kentucky Administrative Regulation 401 KAR 42:080, to categorize petroleum underground storage tank (UST) facilities, that submitted a Notice of Intent to Permanently Close Underground Storage Tanks Form or reported a release after January 1, 1996, into one of four (4) classes based upon their potential impact to human health, safety, and the environment. This document shall also be used to categorize petroleum underground storage tank (UST) facilities, which submitted a Notice of Intent to Permanently Close UST's Form, or reported a release prior to January 1, 1996, and wish to voluntarily classify. Facilities shall be classified by assessing site-specific conditions as documented by a Professional Engineer registered with the Kentucky Board of Registration for Professional Engineers and Land Surveyors, or a Professional Geologist registered with the Kentucky Board of Registration for Professional Geologists, in order to establish the allowable residual levels of petroleum.

Facilities with active petroleum UST systems shall also be classified if analytical results of a site check conducted, in accordance with 401 KAR 42:060, indicate that a release has occurred, or if a confirmed release has been reported. All active petroleum UST systems required to classify shall determine allowable residual soil levels of petroleum constituents by placement into Class III or Class IV as prescribed in this outline.

In every case, allowable residual levels of petroleum constituents in groundwater on site, with the exception of Class I which mandates the use of specific levels, shall not be determined according to the applicable Class but shall be determined by using the Groundwater Worksheet.

By answering the questions in the Classification Guide , each UST facility shall be moved into a particular class and allowable residual levels of petroleum constituents in soil and groundwater shall be established. Knowledge of site history and other site-specific information may be required to answer some questions and further research on the part of the owner or operator may be necessary. In addition, answers to some of these questions may not be possible prior to the site characterization. The Classification Guide shall be completed, signed, and submitted with the Closure Assessment Report Form (see the Underground Storage Tank System Closure Outline incorporated by reference in 401 KAR 42:070), Site Check Report (see the Underground Storage Tank System Site Check Outline incorporated by reference in 401 KAR 42:060), or when specified by the Division.

The allowable residual soil levels in Class III and Class IV may be determined without consideration of the Point of Compliance if the consent of off-site, affected property owner(s) has been obtained where elevated levels, in excess of the specified Point of Compliance standards in Class III and Class IV, will remain on the off-site property. Site-specific conditions and the professional judgement of the registered professional engineer or registered professional geologist shall be utilized to determine the presence of elevated residual soil levels on off-site affected properties. Such consent shall be submitted to the Underground Storage Tank Branch on Form DEP6054/10/95 which is incorporated by reference in 401 KAR 42:080 and shall be accompanied by a site map identifying the location and address of off-site affected properties in relation to the UST facility.

Facilities with multiple UST systems may classify each system individually only if the UST systems are separated by 100 meters (328 feet) or more.

For definition of terms used within this outline, refer to 401 KAR 42:005.

Closure of underground storage tank systems under this classification system shall not constitute designation as a residual landfill.

If you have any questions, contact the Underground Storage Tank Branch at (502) 564-6716 or 800-928-4273.

CLASS I

1.0 Criteria for Closure Under Class I

All of the following criteria shall be established and verified by a registered professional engineer or registered professional geologist in order for a facility to close under Class I:

1.1 Three (3) UST or fewer are present at the facility. Facilities which have had more than three (3) regulated UST on site since December 22, 1988 shall not be allowed closure under Class I;

1.2 The combined total capacity of all UST's, present on site since December 22, 1988, is less than 6000 gallons;

1.3 The UST's were taken out of service and empty prior to December 22, 1988. UST's which have been filled with water or other inert materials shall not contain amounts of free product in excess of 2.5 centimeters (one inch), or 0.3 percent by weight of the total capacity of the UST system in order to close under Class I;

1.4 Closure of the system is to be performed by removal. Facilities performing closure in place shall not be allowed closure under Class I;

1.5 No domestic-use wells, springs, cisterns, or well head protection areas are located within a 100 meter (328 feet) radius from the tank pit;

1.6 No environmentally sensitive features are located within a 100 meter (328 feet) radius from the tank pit, or are sufficiently determined to be hydrogeologically upgradient from the tank pit;

1.7 No clear evidence of a release is observed within the excavation zone or excavated materials (fumes, odors, free product etc.);

1.8 When native soils are encountered, excavation activities shall cease in order to observe the excavation. See Section 2.0 below regarding water within the excavation; and

1.9 No surficial evidence of a subsurface release (seeps, springs, etc.) is observed outside of the excavation within a 150 meter (492 feet) radius from the tank pit.

2.0 Water in the Excavation

Inspect any water encountered within the excavation zone for evidence of a release (e.g. sheen on water surface). If any potential evidence of a release is observed, a determination shall be made as to whether the water encountered meets the definition of groundwater as defined in 401 KAR 42:005. No action shall be required for groundwater within the excavation zone which exhibits no observable evidence of a release.

2.1 Water, determined to be groundwater, indicating evidence of a release shall be sampled and analyzed according to the protocol established in the October 1995 Underground Storage Tank System Closure Outline.

If analysis indicates that the levels in this groundwater are above those specified in Groundwater Table I of the Groundwater Worksheet, the facility shall not be allowed closure under Class I and shall close under either Class III or Class IV.

If analysis indicates that the levels in this groundwater are below those specified in Groundwater Table I of the Groundwater Worksheet, the facility may continue closure under Class I.

2.2 Water encountered within the excavation zone which does not meet the definition of groundwater, but exhibits potential evidence of a release, must be recovered and disposed of properly.

3.0 Excavated Material

3.1 Sampling Requirements

Excavated backfill material which exhibits any potential evidence of a release (eg. unidentified staining or odors), shall be sampled and analyzed, according to the protocol established in the October 1995 Underground Storage Tank System Closure Outline, to the levels specified in Soil Table 3.

If analysis indicates levels above those specified in Soil Table 3, the facility shall not be allowed closure under Class I.

If analysis indicates levels below those specified in Soil Table 3, the facility may continue closure under Class I.

3.2 Disposal Requirements

If no clear evidence of a release is observed, or if excavated material with unidentified potential evidence of a release is sampled, analyzed, and meets the levels specified in Soil Table 3, the material may:

- be used as backfill for the on-site UST pit;
- be disposed of at a permitted landfill or landfarm; or
- be treated on or off site through Registered Permit By Rule requirements of the Division of Waste Management.

Any excavated material to be used for an unrestricted off-site purpose, shall be sampled and analyzed, according to the protocol established in the October 1995 Underground Storage Tank System Closure Outline, to meet levels specified in Soil Table 3.

4.0 Closure

Once it has been established that the criteria and requirements of Sections 1, 2, and 3 have been satisfied, no further assessment of the excavation shall be necessary.

5.0 Documentation Requirements

5.1 All data and supporting information shall be collected and submitted to the Underground Storage Tank Branch which demonstrate that the requirements and criteria in Sections 1, 2 and 3 have been met.

5.2 Color photographs or color photocopies of the excavation shall be submitted to the Underground Storage Tank Branch .

5.3 A completed and signed Classification Guide shall be submitted to the Underground Storage Tank Branch.

5.4 Refer to the October 1995 Underground Storage Tank System Closure Outline for additional closure documentation requirements.

CLASS II

1.0 Criteria for Closure Under Class II

All of the following criteria shall be established and verified by a registered professional engineer or registered professional geologist in order to close a UST facility under Class II:

1.1 Closure of the UST system is to be performed by removal. Facilities performing closure in place shall not be allowed closure under Class II;

1.2 External leak detection devices (as specified in 40 CFR 280.43, e,f), interstitial monitoring, or secondary barriers have been in operation for the operational life of the UST system. This includes vapor monitoring, groundwater monitoring, interstitial monitoring or secondary barriers;

1.3 No leaks or releases have been detected over the operational life of the UST system; and

1.4 No evidence of a release is observed in the excavation zone (fumes, odors, holes in tanks or piping, sheen on pit water, free product etc.) after backfill material has been removed. When native soils are encountered, excavation activities shall cease in order to observe the excavation.

2.0 Excavated Material

2.1 Sampling Requirements

If the above criteria for closure under Class II have been met, sampling of the removed backfill material is not required.

2.2 Disposal Requirements

If any evidence of a release (fumes, odors, staining etc.) is present within the removed backfill material, the material shall:

- be disposed of at a permitted landfill or landfarm; or
- be treated on or off site through Registered Permit-By-Rule requirements of the Division of Waste Management.

Any removed backfill material to be used for an unrestricted off-site purpose, shall be sampled and analyzed, according to the protocol established in the October 1995 Underground Storage Tank System Closure Outline, to meet the levels specified in Soil Table 3.

If there is no evidence of a release within the removed backfill material, the material may:

- be used as backfill for the on-site UST pit; or
- be disposed of at a permitted landfill or landfarm

Any removed backfill material to be used for an unrestricted off-site purpose, shall be sampled and analyzed, according to the protocol established in the October 1995 Underground Storage Tank System Closure Outline, to meet the levels specified in Soil Table 3.

3.0 Closure

Once it has been established that the criteria and requirements of Sections 1 and 2 have been satisfied, no further assessment of the excavation shall be necessary.

4.0 Documentation Requirements

4.1 All data and supporting information shall be collected and submitted to the Underground Storage Tank Branch which demonstrate that the requirements and criteria in Sections 1 and 2 have been met.

4.2 Color photographs or color photocopies of the excavation shall be submitted to the Underground Storage Tank Branch.

4.3 A completed and signed Classification Guide shall be submitted.

4.4 Refer to the October 1995 Underground Storage Tank System Closure Outline for additional closure documentation requirements.

CLASS III

1.0 Criteria for Closure Under Class III

All of the following criteria shall be established and verified by a registered professional engineer or registered professional geologist in order for a facility to close under Class III:

1.1 No domestic use wells, springs, cisterns, or well head protection areas are located within a 100 meter (328 feet) radius from the tank pit.

1.2 No environmentally sensitive features are located within a 50 meter (164 feet) radius from the tank pit, or are sufficiently documented to be hydrogeologically upgradient from the tank pit.

1.3 No surficial evidence of a subsurface release (seeps, springs etc.) is observed outside of the excavation, or fumes detected inside buildings, within a 150 meter (492 feet) radius from the tank pit.

2.0 General Requirements For Facilities Closing Under Class III

2.1 Any free product encountered shall be recovered immediately.

2.2 Soils within the tank pit, piping trenches, and excavated material shall be sampled and analyzed according to the protocol specified in the October 1995 Underground Storage Tank System Closure Outline.

2.3 A groundwater sample shall be collected in the hydrogeologically downgradient area most likely to be affected by a release from the UST system and analyzed if the collection of a composite soil sample from the bottom of the excavation or from borings at the required depth for closure in place or active systems is not possible due to the presence of bedrock, or if allowable soil levels cannot be achieved at the soil/bedrock interface.

2.4 Water encountered in the excavation zone, which does not meet the definition of groundwater, shall be recovered and disposed of properly. If possible, preventive measures shall be taken to reduce the amount of water entering the excavation zone from the surface.

2.5 Assess sanitary sewer lines, storm sewer lines, and telephone man-vaults within a 50 meter (164 feet) radius from the tank pit for levels exceeding ten percent (10%) of the Lower Explosive Limit (LEL). If LEL levels exceed ten percent (10%), initial abatement measures as prescribed by the October 1995 Underground Storage Tank System Release Response and Initial Abatement Requirements Outline must be followed.

3.0 Groundwater

3.1 Any groundwater encountered during the closure process (i.e. within the excavation, trenches or in any borings required) shall be sampled and analyzed according to the protocol specified in the October 1995 Underground Storage Tank System Closure Outline. If levels of petroleum constituents in groundwater exceed those specified by the
Groundwater Worksheet, a site investigation shall be performed in accordance with the October 1995 Underground Storage Tank System Site Investigation Outline.

3.2 If allowable soil levels are present in the walls and bottom of the excavation, and groundwater has not been encountered within the excavation, an assessment shall be made to a depth of 1 meter below the bottom of the excavation, or to the soil/bedrock interface if less than 1 meter below the bottom, to confirm the absence of groundwater. If groundwater is encountered in the 1 meter zone, it shall be sampled and analyzed according to the protocol specified in the October 1995 Underground Storage Tank System Closure Outline. If levels of petroleum constituents in groundwater exceed those specified by the Groundwater Worksheet, a site investigation shall be performed in accordance with the October 1995 Underground Storage Tank System Site Investigation Outline.

4.0 Establishing Soil Cleanup Standards

Two tables, Class III Soil Table 1 and Class III Soil Table 2, specify the allowable residual petroleum constituent levels in soil for closure under Class III. A site specific determination, based on the subsequent criteria, shall be made to establish the appropriate Class III Soil Table to be used.

CLASS III SOIL TABLE 1

5.0 Class III Soil Table 1 Criteria

Class III Soil Table 1 shall be used if any of the following are present:

5.1 The facility is located in a carbonate bedrock setting, as determined through a geologic quadrangle map analysis, (see Section 5.1, page 15 for a detailed description of this geologic setting);

5.2 Domestic use wells, springs, cisterns, or well head protection areas are located within a 100 to 300 meter (328 feet to 984 feet) radius from the tank pit;

5.3 Environmentally sensitive features are located within a 50 to 150 meter (164 feet to 492 feet) radius from the tank pit and are hydrogeologically downgradient from the tank pit;

5.4 Groundwater is encountered in the tank pit or piping trench excavation, or borings as required for closure in place and active systems;

5.5 Groundwater is not encountered within the tank pit or piping trench excavation, or borings as required for closure in place and active systems, and documentation has not been submitted to demonstrate that groundwater is at a depth of more than 30 feet from the surface; and

5.6 Water supply lines, sanitary sewer lines, storm sewer lines, or telephone man-vaults are located within a 50 meter (164 feet) radius from the tank pit.

6.0 Corrective Action Measures Allowed When Soil Levels Exceed Class III Soil Table 1 Standards

6.1 The following corrective action measures are allowed to achieve Class III Soil Table 1 levels when levels exceeding those specified in Class III Soil Table 1 do not extend beyond the Point of Compliance:

- continued excavation; or
- a site investigation performed in accordance with 401 KAR 42:060, followed by in-situ corrective action performed in accordance with 401 KAR 42:060, or continued excavation.

6.2 Any residual soil levels in excess of those specified in Class III Soil Table 1, which extend outside of the Point of Compliance, shall be remediated to achieve the specified Class IV Soil Matrix Table levels as determined by the following procedures:

- determine the appropriate Class IV Soil Matrix Table, soil type, and depth to groundwater according to the protocol established within Class IV;
- using the 0 - 100 distance parameter within the Class IV Soil Matrix Table, apply the site-specific soil type and depth to groundwater measurements to determine the allowable levels of petroleum constituents in soil. NOTE: In no situation shall soil levels exceeding those specified in Class III Soil Table 1 be allowed outside of the Point of Compliance except as specified in Section 6.4 below.

Class III Soil Table 1 levels may, however, be applied to soil within the Point of Compliance in this situation.

6.3 The following corrective action measures are allowed to achieve the applicable Class IV Soil Matrix Table levels outside of the Point of Compliance when soil levels exceeding those specified in Class III Soil Table 1 extend beyond the Point of Compliance:

- continued excavation; or
- a site investigation performed in accordance with 401 KAR 42:060, followed by in-situ corrective action performed in accordance with 401 KAR 42:060, or continued excavation.

6.4 The allowable residual soil levels in Class III may be determined without consideration of the Point of Compliance if the consent of off-site, affected property owner(s) has been obtained where elevated levels, in excess of the specified Point of Compliance standards in Class III, will remain on the off-site property. Site-specific conditions and the professional judgement of the registered professional engineer or registered professional geologist shall be utilized to determine the presence of elevated residual soil levels on off-site affected properties. Such consent shall be submitted to the Underground Storage Tank Branch on Form DEP6054/10/95, which is incorporated by reference in 401 KAR 42:080 and shall be accompanied by a site map identifying the location and address of off-site affected properties in relation to the UST facility.

CLASS III SOIL TABLE 2

7.0 Class III Soil Table 2 Criteria

Class III Soil Table 2 may be used if all of the following are established:

7.1 Domestic use wells, springs, cisterns, or well head protection areas are located beyond a 300 meter (984 feet) radius from the tank pit;

7.2 Environmentally sensitive features are located beyond a 150 meter (492 feet) radius from the tank pit, or are sufficiently determined to be hydrogeologically upgradient from the tank pit;

7.3 Site-specific information is submitted to demonstrate that groundwater is at a depth of more than 30 feet from the surface; and

7.4 Soil samples collected at the nearest hydrogeologically downgradient Point of Compliance indicate levels below those specified in Class III Soil Table 1. (See Section 8.0 below)

8.0 Point of Compliance Assessment Requirement When Class III Soil Table 2 Is Used

All facilities requesting closure under Class III Soil Table 2 shall assess the hydrogeologically downgradient Point of Compliance. Three (3) soil borings shall be conducted to a depth of 15 feet from the surface or to the soil/bedrock interface if encountered less than 15 feet from the surface. Soil exhibiting the highest field instrumentation reading from each boring shall be collected in accordance with state sampling protocol and analyzed individually to the standards specified in Class III Soil Table 1. (see Section 9.4 below)

9.0 Corrective Action Measures Allowed When Soil Levels Exceed Class III Soil Table 2 Standards

9.1 The following corrective action measures are allowed to achieve Class III Soil Table 2 levels when soil levels exceeding those specified in Class III Soil Table 2 do not extend
to the Point of Compliance:

- continued excavation; or
- a site investigation performed in accordance with 401 KAR 42:060, followed by in-situ corrective action performed in accordance with 401 KAR 42:060, or continued excavation.

9.2 Any residual soil levels in excess of those specified in Class III Soil Table 1 at or extending outside of the Point of Compliance (see section 8.0 above) shall be remediated to achieve the specified Class IV Matrix Table levels as determined by the following procedures:

- determine the appropriate Class IV Soil Matrix Table, soil type, and depth to groundwater according to the protocol established within Class IV;
- using the 0 - 100 distance parameter within the Class IV Soil Matrix Table, apply the site-specific soil type and depth to groundwater measurements to determine the allowable levels of petroleum constituents in soil. NOTE: In no situation shall soil levels exceeding those specified in Class III Soil Table 1 be allowed outside of the Point of Compliance except as specified in Section 9.4 below.

Class III Soil Table 1 levels shall be applied to soil within the Point of Compliance in this situation.

9.3 The following corrective action measures are allowed to achieve the applicable Class IV Soil Matrix Table levels when soil levels exceeding those specified in Class III Soil Table 1 extend beyond the Point of Compliance:

- continued excavation; or
- a site investigation performed in accordance with 401 KAR 42:060, followed by in-situ corrective action, performed in accordance with 401 KAR 42:060 or continued excavation.

9.4 The allowable residual soil levels in Class III may be determined without consideration of the Point of Compliance if the consent of off-site affected property owner(s) has been obtained where elevated levels, in excess of the specified Point of Compliance standards in Class III, will remain on the off-site property. Site-specific conditions and the professional judgement of the registered professional engineer or registered professional geologist shall be utilized to determine the presence of elevated residual soil levels on off-site affected properties. Such consent shall be submitted to the Underground Storage Tank Branch on Form DEP6054/10/95, which is incorporated by reference in 401 KAR 42:080 and shall be accompanied by a site map identifying the location and address of off-site affected properties in relation to the UST facility.

10.0 Excavated Material

10.1 Sampling Requirements

All excavated material shall be sampled and analyzed in accordance with the October 1995 Underground Storage Tank System Closure Outline.

10.2 Disposal Requirements

The following options are available for the disposal of excavated material:

- Excavated material may be used as backfill for the on-site UST pit if analysis indicates levels below those specified in the applicable table (Class III Tables 1 or 2). If this option is chosen, a layer of clean material shall be placed above the backfilled excavated material to a minimum depth of two (2) meters (6.5 feet) from the ground surface.
- Excavated material may be disposed of at a permitted landfill or landfarm.
- Excavated material may be treated on or off site through Registered Permit-By-Rule requirements of the Division of Waste Management.
- If the excavated material is to be used for any un-restricted off-site purpose, it shall be sampled and analyzed to the levels specified in Soil Table 3 (page 26). If analysis indicates levels above those specified in Soil Table 3, the material shall be disposed of properly.

11.0 Documentation Requirements

11.1 All data and supporting information shall be collected and submitted to the Underground Storage Tank Branch.

11.2 A completed and signed Classification Guide shall be submitted to the Underground Storage Tank Branch.

11.3 Refer to the October 1995 Underground Storage Tank System Closure Outline for additional closure documentation requirements.

11.4 A completed and signed Consent Form DEP 6054/10/95 shall be submitted to the Underground Storage Tank Branch if the Point of Compliance requirements are disregarded.

CLASS III SOIL TABLE 1

BTEX		
BENZENE	2	PPM
TOLUENE	18	PPM
ETHYLBENZENE	30	PPM
XYLENE (TOTAL)	50	PPM
PAH		
Ch	15	PPM
B(a)A	0.15	PPM
cPAH	0.3	PPM
nPAH	10	PPM
NAP	5.0	PPM
Total Lead		
50 PPM or Established Background		

CLASS III SOIL TABLE 2

BTEX		
BENZENE	10	PPM
TOLUENE	90	PPM
ETHYLBENZENE	150	PPM
XYLENE (TOTAL)	250	PPM
PAH		
Ch	15	PPM
B(a)A	0.15	PPM
cPAH	0.3	PPM
nPAH	100	PPM
NAP	50	PPM
Total Lead		
50 PPM or Established Background		

BTEX: Benzene, Toluene, Ethylbenzene, and Xylene(total)
PAH: Polynuclear Aromatic Hydrocarbons
Ch: Allowable level individually for Chrysene
B(a)A: Allowable level individually for Benzo(a)anthracene
cPAH: Allowable level individually for Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, and Ideno(1,2,3-cd)pyrene
nPAH: Allowable level individually for Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene.
NAP: Allowable Level Individually for Naphthalene
PPM: mg/kg - Part Per Million

NOTE: Refer to the October 1995 Underground Storage Tank System Closure Outline for details concerning analytical requirements and procedures for establishing background.

For allowable levels in groundwater, refer to the Groundwater Worksheet.

CLASS IV

1.0 Procedural Requirements

The following procedures shall be required to establish the allowable levels of petroleum constituents in soil for closure, and shall be documented by a registered professional engineer or registered professional geologist. This class includes all facilities which do not meet the requirements of Classes I, II or III.

1.1 Any free product encountered shall be recovered immediately.

1.2 Soil type shall be determined according to grain size. The soil samples to be analyzed for grain size shall be collected from the bottom of the pit, with three (3) samples collected along the longest straight line that can be drawn diagonally across the pit; take one sample at each end and one in the middle of the line. (Facilities performing closure in place shall collect samples from the bottom of three (3) of the borings required.) Each of these samples shall be classified individually according to ASTM Designation: D 422-63 (Reapproved 1990) Standard Test Method For Particle-Size Analysis of Soils. The soil type shall be defined by the 50 percent value (D50) as plotted on a grain size distribution curve (a semi-logarithmic plot) with weight percent finer plotted on the arithmetic scale and the grain sizes plotted on the semi-logarithmic scale. If two or more of the three soils analyzed fall into one soil type, that shall be the soil type for the facility. If the soil types are all different, the sand size shall be the soil type for the facility.

If collection of soil samples is not possible from the bottom of the excavation due to bedrock, three (3) samples shall be collected from the walls of the excavation as close to the bottom of the excavation as possible for grain size analysis using the above methodology. In situations where the excavation is made up entirely of bedrock and soil sample collection is not possible from either the bottom or the walls of the excavation, the sand size shall be used as the soil type for the facility.

The requirement for soil grain size analysis shall be waived if the most stringent Class IV Soil Matrix Table levels are used, taking into account each soil type and the appropriate depth to groundwater and distance parameters within the applicable Class IV Soil Matrix Table.

1.3 Determine the depth of any groundwater encountered during the closure process.

1.4 Determine the distance to the nearest hydrogeologically downgradient Point of Compliance from the tank pit.

1.5 Determine the distance to any hydrogeologically downgradient environmentally sensitive features within a 300 meter (984 feet) radius from the tank pit.

1.6 Determine the distance to any domestic use wells, springs, cisterns, or well head protection areas within a 300 meter (984 feet) radius from the tank pit.

1.7 Investigate and document any evidence of fumes or petroleum odors in adjacent buildings within a 150 meter (492 feet) radius from the tank pit.

2.0 General Requirements For Facilities Closing Under Class IV

2.1 Any free product encountered shall be recovered immediately.

2.2 Soils within the tank pit, piping trenches and excavated material shall be sampled and analyzed according to the protocol specified in the October 1995 Underground Storage Tank System Closure Outline.

2.3 A groundwater sample shall be collected in the hydrogeologically downgradient area most likely to be affected by a release from the UST system and analyzed, if the collection of a composite soil sample from the bottom of the excavation or from borings at the required depth for closure in place is not possible due to the presence of bedrock, or if allowable soil levels cannot be achieved at the soil/bedrock interface.

2.4 Water encountered in the excavation zone that does not meet the definition of groundwater shall be recovered and disposed of properly. If possible, preventive measures shall be taken to reduce the amount of water entering the excavation from the surface.

2.5 Assess sanitary sewer lines, storm sewer lines, and telephone man-vaults within a 50 meter (164 feet) radius from the tank pit for levels exceeding ten percent (10%) of the Lower Explosive Limit (LEL). If LEL levels exceed ten percent (10%), initial abatement measures as prescribed by the October 1995 Underground Storage Tank System Release Response and Initial Abatement Requirements Outline must be followed.

3.0 Groundwater

3.1 Any groundwater encountered during the closure process (i.e. within the excavation, trenches or in any borings required) shall be sampled and analyzed according to the protocol specified in the October 1995 Underground Storage Tank System Closure Outline. If levels of petroleum constituents in groundwater exceed those specified by the Groundwater Worksheet, a site investigation shall be performed in accordance with the October 1995 Underground Storage Tank System Site Investigation Outline.

3.2 If allowable soil levels are present in the walls and bottom of the excavation, and groundwater has not been encountered within the excavation, an assessment shall be made to a depth of 1 meter below the bottom of the excavation, or to the soil/bedrock interface if less than 1 meter below the bottom, to confirm the absence of groundwater. If groundwater is encountered in the 1 meter zone, it shall be sampled and analyzed according to the protocol specified in the October 1995 Underground Storage Tank System Closure Outline. If levels of petroleum constituents in groundwater exceed those specified by the Groundwater Worksheet, a site investigation shall be performed in accordance with the October 1995 Underground Storage Tank System Site Investigation Outline.

4.0 Selection of a Matrix Table

Each facility in Class IV shall be placed into one of three Class IV Soil Matrix Tables, which indicate the allowable soil levels for closure, based upon the geologic setting in which the facility is located. The geologic setting of the facility shall be determined by locating the facility on a 7.5 Minute USGS Geological Quadrangle Map. A description of the geology is in the legend where a geologic column for the quadrangle and a detailed description of the formations is presented.

4.1 NOTE: Any facility with plastic PVC water supply lines within a 50 meter (164 feet) radius from the tank pit, or with storm sewer lines, sanitary sewer lines, or telephone man-vaults within a 50 meter (164 feet) radius from the tank pit which, when measured within the conduit, indicate levels exceeding ten percent (10%) of the Lower Explosive limit (LEL), shall be placed into Class IV Soil Matrix Table I.

5.0 Geologic Formations Included in Each Matrix Table

5.1 Class IV Soil Matrix Table I

Carbonate Bedrock Settings: These areas are underlain by carbonate rocks including limestone, dolostone, interbedded limestone and shale, or interbedded dolostone and shale. Carbonate rocks will be shown on the 7.5 Minute USGS Geologic Quadrangle Map as geologic formations composed of limestone or dolomite.

5.2 Class IV Soil Matrix Table II

Alluvium: These areas are underlain by deposits of Quaternary Alluvium found predominantly in the valleys along major streams (third order or greater). This setting includes sediments of lacustrine deposition or sediments derived from other glacial deposits.

Fractured Shales: These areas are underlain by thick sections of fractured shale and include the Devonian and Lower Mississippian shales as well as other areas of the state where shale is the predominant bedrock material.

Fractured Sandstone and Shale (Eastern Coal Field): These areas are underlain by alternating units of sandstone, siltstone, shale, limestone, coal, and clay. These deposits are mapped on the Geologic Quadrangle maps as predominantly Pennsylvanian in age and occur in the Eastern Coal Field Physiographic Region of the state.

5.3 Class IV Soil Matrix Table III

Gulf Coastal Plain Sediments: These areas are underlain by sediments of Cretaceous and Tertiary Age and are commonly overlain by Pleistocene loess. This geologic setting is found mainly in the Jackson Purchase Physiographic Region of Western Kentucky. Note: Quaternary Alluvial deposits located within the Jackson Purchase Physiographic region are not considered Gulf Coastal Plain Sediments and shall be referred to Class IV Soil Matrix Table II.

Fractured Sandstone and Shale (Western Coal Field): These areas are underlain by alternating units of sandstone, siltstone, shale, limestone, coal, and clay. These deposits are mapped on the Geologic Quadrangle maps as predominantly Pennsylvanian in age and occur in the Western Coal Field Physiographic Region of the state.

6.0 Criteria To Determine Appropriate Soil Levels Within Each Class IV Soil Matrix Table

Once the facility has been placed into the appropriate Class IV Soil Matrix Table, the applicable soil levels shall be based on all of the following criteria:

- depth to groundwater;
- distance to the nearest hydrogeologically downgradient Point of Compliance from the tank pit (see Section 8.3);
- distance to domestic use wells, springs, cisterns, or well head protection areas if less than the distance to the nearest hydrogeologically downgradient property line;
- distance to hydrogeologically downgradient environmentally sensitive features if less than the distance to the nearest hydrogeologically downgradient property line; and
- soil type present at the facility (sand, silt, or clay).

6.1 NOTE: Environmentally sensitive features within 300 meters (984 feet) shall not dictate the allowable levels in this class if sufficient documentation is submitted to indicate that the feature is hydrogeologically upgradient from the tank pit.

7.0 Determining Depth To Groundwater

7.1 Depth to groundwater shall be determined by the following:

- assessment of existing monitoring devices on site;

- performance of a site-specific investigation (e.g. drilling to groundwater, etc.) to determine depth to groundwater;

- a visual examination of the tank pit and piping trench -- if existing monitoring devices are not present on site for an actual determination to be made as to depth to groundwater, or to avoid a site-specific investigation, e.g. drilling until groundwater is encountered, etc. If groundwater is encountered within the tank pit excavation, piping trench, or borings as required for closure in place and active systems, the 4.5 Meter depth to groundwater levels shall be used within the appropriate Class IV Soil Matrix Table. If groundwater is not present within the tank pit excavation, piping trench, or borings as required for closure in place and active systems, the actual depth of the tank pit excavation shall be noted, and the depth listed in the appropriate Class IV Soil Matrix Table which is equal to or immediately greater than the actual depth of the tank pit excavation shall be used.

7.2 If an actual determination of depth to groundwater, below the bottom of the excavation, is made which falls between the depths listed within the Class IV Soil Matrix Tables, the upper depth listed shall be used to determine allowable levels. For example, if the depth to groundwater is established at 12 meters through a site-specific determination, the 10.5 meter depth to groundwater levels shall be used as opposed to the 13.5 meter depth to groundwater levels.

8.0 Corrective Action and Point of Compliance Requirements

8.1 Any residual soil levels in excess of those specified in Class III Soil Table 1, which extend outside of the Point of Compliance, shall be remediated to achieve the specified Class IV Soil Matrix Table levels as determined by the following procedures:

- determine the appropriate Class IV Soil Matrix Table, soil type, and depth to groundwater according to the protocol established within Class IV;
- using the 0 - 100 distance parameter within the Class IV Soil Matrix Table, apply the site-specific soil type and depth to groundwater measurements to determine the allowable levels of petroleum constituents in soil. NOTE: In no situation shall soil levels exceeding those specified in Class III Soil Table 1 be allowed outside of the Point of Compliance except as specified in Section 8.3 below.

Original Class IV Soil Matrix Table levels may, however, be applied to soil within the Point of Compliance in this situation.

8.2 The following options are available to achieve allowable levels when soil levels exceed those specified in the applicable Class IV Soil Matrix Table as prescribed within and outside of the Point of Compliance:

- continued excavation; or
- a site investigation performed in accordance with 401 KAR 42:060, followed by in-situ corrective action performed in accordance with 401 KAR 42:060, or continued excavation.

8.3 The allowable residual soil levels in Class IV may be determined without consideration of the Point of Compliance if the consent of off-site affected property owner(s) has been obtained where elevated levels, in excess of the specified Point of Compliance standards in Class IV, will remain on the off-site property. Site-specific conditions and the professional judgement of the registered professional engineer or registered professional geologist shall be utilized to determine the presence of elevated residual soil levels on off-site affected properties. Such consent shall be submitted to the Underground Storage Tank Branch on Form DEP6054/10/95, which is incorporated by reference in 401 KAR 42:080 and shall be accompanied by a site map identifying the location and address of off-site affected properties in relation to the UST facility.

9.0 Excavated Material

9.1 Sampling Requirements

All excavated material shall be sampled and analyzed in accordance with the October 1995 Underground Storage Tank System Closure Outline.

9.2 Disposal Requirements

The following options are available for the disposal of excavated material:

- Excavated material may be used as backfill for the on-site UST pit if analysis indicates levels below those specified in the applicable Class IV Soil Matrix Table. If this option is chosen, a layer of clean material shall be placed above the backfilled excavated material to a minimum depth of two (2) meters (6.5 feet) from the ground surface;

- Excavated material may be disposed of at a permitted landfill or landfarm;

- Excavated material may be treated on or off site through Registered Permit-By-Rule requirements of the Division of Waste Management; or

- If the excavated material is to be used for any un-restricted off-site purpose, it shall be sampled and analyzed to the levels specified in Soil Table 3 (page 25). If analysis indicates levels above those specified in Soil Table 3, the material shall be disposed of properly.

10.0 Documentation Requirements

10.1 All data and supporting information shall be collected and submitted to the Underground Storage Tank Branch.

10.2 A completed and signed Classification Guide shall be submitted to the Underground Storage Tank Branch.

10.3 Refer to the October 1995 Underground Storage Tank System Closure Outline for additional closure documentation requirements.

10.4 A completed and signed Consent Form DEP 6054/10/1995 shall be submitted to the Underground Storage Tank Branch if the Point of Compliance requirements are disregarded.

CLASS IV SOIL MATRIX TABLE I - (A)

(Gasoline, Kerosene, Jet Fuel)

SOIL TYPE	DEPTH TO GROUNDWATER (METERS)	DISTANCE TO HYDROGEOLOGICALLY DOWNGRADIENT POINT OF COMPLIANCE, DOMESTIC USE WELL, SPRING, CISTERN, OR WELL HEAD PROTECTION AREA, OR ENVIRONMENTALLY SENSITIVE FEATURE		
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
SAND	4.5	0.1/35/30/210	0.1/100/120/500	1.0/180/300/500
	5.5	0.5/110/100/500	0.4/180/300/500	4.0/180/300/500
	7.5	0.8/180/160/500	0.8/180/300/500	7.0/180/300/500
	10.5	1.0/180/230/500	1.0/180/300/500	10/180/300/500
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
SILT	4.5	0.1/35/30/230	0.1/100/120/500	1.0/180/300/500
	5.5	0.4/80/80/500	0.4/180/290/500	4.0/180/300/500
	7.5	0.6/180/140/500	0.6/180/300/500	6.0/180/300/500
	10.5	1.0/180/240/500	1.0/180/300/500	12/180/300/500
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
CLAY	4.5	0.1/35/30/240	0.1/100/120/500	1.0/180/300/500
	5.5	0.3/80/60/470	0.3/180/220/500	3.0/180/300/500
	7.5	0.5/150/100/500	0.5/180/300/500	5.0/180/300/500
	10.5	2.0/180/300/500	2.0/180/300/500	16/180/300/500

B/T/E/X: Benzene/Toluene/Ethylbenzene/Xylene(total)
PPM: Part Per Million

CLASS IV SOIL MATRIX TABLE I - (B)

(Diesel, Waste Oil, New Oil)

SOIL TYPE	DEPTH TO GROUNDWATER (METERS)	DISTANCE TO HYDROGEOLOGICALLY DOWNGRADIENT POINT OF COMPLIANCE, DOMESTIC USE WELL, SPRING, CISTERN, OR WELL HEAD PROTECTION AREA, OR ENVIRONMENTALLY SENSITIVE FEATURE		
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)	**Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)**
SAND	4.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	5.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	7.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)	**Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)**
SILT	4.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	5.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	7.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)	**Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM) LEAD (PPM)**
CLAY	4.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	5.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	7.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0 50 OR BGRD.	15/0.15/0.3/20/10 50 OR BGRD.	15/0.15/0.3/100/50 50 OR BGRD.

PAH: Polynuclear Aromatic Hydrocarbons
Ch: Allowable level individually for Chrysene
B(a)A: Allowable level individually for Benzo(a)anthracene
cPAH: Allowable level individually for Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, and Ideno(1,2,3-cd)pyrene
nPAH: Allowable Level Individually for Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene.
NAP: Allowable Level Individually for Naphthalene
PPM: mg/kg - Part Per Million
50 or BGRD: 50 Parts Per Million or Site-Specifically Established Background for Total Lead

CLASS IV SOIL MATRIX TABLE II - (A)

(Gasoline, Kerosene, Jet Fuel)

SOIL TYPE	DEPTH TO GROUNDWATER (METERS)	DISTANCE TO HYDROGEOLOGICALLY DOWNGRADIENT POINT OF COMPLIANCE, DOMESTIC USE WELL, SPRING, CISTERN, OR WELL HEAD PROTECTION AREA, OR ENVIRONMENTALLY SENSITIVE FEATURE		
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
SAND	4.5	0.01/0.5/0.4/3.0	0.07/45/100/330	20/180/300/500
	5.5	0.01/2.0/2.0/18	0.3/180/300/500	20/180/300/500
	7.5	0.02/7.0/4.0/40	0.9/180/300/500	20/180/300/500
	10.5	0.05/20/10/90	2.0/180/300/500	20/180/300/500
	13.5	0.1/40/20/190	4.0/180/300/500	20/180/300/500
	16.5	0.2/70/40/320	7.0/180/300/500	20/180/300/500
	23.5	1.0/180/210/500	20/180/300/500	20/180/300/500
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
SILT	4.5	0.01/0.5/0.4/3.0	0.07/45/100/330	20/180/300/500
	5.5	0.03/2.0/4.0/40	1.0/180/300/500	20/180/300/500
	7.5	0.2/40/30/330	10/180/300/500	20/180/300/500
	10.5	0.8/180/180/500	20/180/300/500	20/180/300/500
	13.5	6.0/180/300/500	20/180/300/500	20/180/300/500
	16.5	20/180/300/500	20/180/300/500	20/180/300/500
	23.5	20/180/300/500	20/180/300/500	20/180/300/500
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
CLAY	4.5	0.01/0.5/0.4/3.0	0.07/45/100/330	20/180/300/500
	5.5	0.1/50/40/250	7.0/180/300/500	20/180/300/500
	7.5	19/180/300/500	20/180/300/500	20/180/300/500
	10.5	20/180/300/500	20/180/300/500	20/180/300/500
	13.5	20/180/300/500	20/180/300/500	20/180/300/500
	16.5	20/180/300/500	20/180/300/500	20/180/300/500
	23.5	20/180/300/500	20/180/300/500	20/180/300/500

B/T/E/X: Benzene/Toluene/Ethylbenzene/Xylene(total)
PPM: Part Per Million

CLASS IV SOIL MATRIX TABLE II - (B)

(Diesel, Waste Oil, New Oil)

SOIL TYPE	DEPTH TO GROUNDWATER (METERS)	DISTANCE TO HYDROGEOLOGICALLY DOWNGRADIENT POINT OF COMPLIANCE , DOMESTIC USE WELL, SPRING, CISTERN, OR WELL HEAD PROTECTION AREA, OR ENVIRONMENTALLY SENSITIVE FEATURE					
		0 - 100 METERS		100 - 300 METERS		> 300 METERS	
		Ch/B(a)A/cPAH/nPAH/NAP (PPM)	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**
SAND	4.5	15/0.15/0.3/3.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	5.5	15/0.15/0.3/9.0/2.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	7.5	15/0.15/0.3/10/4.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	13.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	16.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	23.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
SILT	4.5	15/0.15/0.3/3.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	5.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	7.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	13.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	16.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	23.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
CLAY	4.5	15/0.15/0.3/3.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	5.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	7.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	13.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	16.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	23.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.

PAH: Polynuclear Aromatic Hydrocarbons
Ch: Allowable level individually for Chrysene
B(a)A: Allowable level individually for Benzo(a)anthracene
cPAH: Allowable level individually for Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, and Ideno(1,2,3-cd)pyrene
nPAH: Allowable Level Individually for Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene.
NAP: Allowable Level Individually for Naphthalene
50 or BGRD: 50 Parts Per Million or Site-Specifically Established Background for Total Lead

CLASS IV SOIL MATRIX TABLE III - (A)

(Gasoline, Kerosene, Jet Fuel)

SOIL TYPE	DEPTH TO GROUNDWATER (METERS)	DISTANCE TO HYDROGEOLOGICALLY DOWNGRADIENT POINT OF COMPLIANCE, DOMESTIC USE WELL, SPRING, CISTERN, OR WELL HEAD PROTECTION AREA, OR ENVIRONMENTALLY SENSITIVE FEATURE		
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
SAND	4.5	0.01/0.5/0.4/3.0	0.01/4.0/5.0/30	0.1/60/150/430
	5.5	0.01/2.0/1.0/13	0.04/16/18/110	0.3/180/300/500
	7.5	0.01/4.0/2.0/20	0.08/30/30/170	0.6/180/300/500
	10.5	0.02/6.0/3.0/30	0.1/50/40/250	0.9/180/300/500
	13.5	0.02/8.0/4.0/40	0.1/70/50/310	1.0/180/300/500
	16.5	0.03/9.0/5.0/50	0.2/80/60/390	1.0/180/300/500
	23.5	0.05/15/8.0/80	0.3/120/100/500	2.0/180/300/500
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
SILT	4.5	0.01/0.5/0.4/3.0	0.01/4.0/5.0/30	0.1/60/150/430
	5.5	0.01/1.0/1.0/10	0.04/10/13/90	0.3/130/300/500
	7.5	0.01/3.0/2.0/20	0.06/25/20/170	0.5/180/300/500
	10.5	0.02/5.0/3.0/30	0.1/45/40/260	1.0/180/300/500
	13.5	0.03/8.0/5.0/45	0.2/70/60/390	1.0/180/300/500
	16.5	0.04/12/9.0/70	0.2/100/100/500	2.0/180/300/500
	23.5	0.09/30/18/150	0.6/180/220/500	4.0/180/300/500
		0 - 100 METERS	100 - 300 METERS	> 300 METERS
		B/T/E/X (PPM)	**B/T/E/X (PPM)**	**B/T/E/X (PPM)**
CLAY	4.5	0.01/0.5/0.4/3.0	0.01/4.0/5.0/30	0.1/60/150/430
	5.5	0.01/0.7/0.8/7.0	0.03/6.0/10/60	0.3/80/280/500
	7.5	0.01/2.0/1.0/13	0.05/19/17/110	0.4/180/300/500
	10.5	0.03/7.0/7.0/40	0.2/60/80/370	1.0/180/300/500
	13.5	0.09/20/15/120	0.5/170/180/500	4.0/180/300/500
	16.5	0.4/50/35/290	2.0/180/300/500	18/180/300/500
	23.5	0.5/50/70/330	3.0/180/300/500	20/180/300/500

B/T/E/X: Benzene/Toluene/Ethylbenzene/Xylene(total)
PPM: Part Per Million

CLASS IV SOIL MATRIX TABLE III - (B)

(Diesel, Waste Oil, New Oil)

SOIL TYPE	DEPTH TO GROUNDWATER (METERS)	DISTANCE TO HYDROGEOLOGICALLY DOWNGRADIENT POINT OF COMPLIANCE, DOMESTIC USE WELL, SPRING, CISTERN, OR WELL HEAD PROTECTION AREA, OR ENVIRONMENTALLY SENSITIVE FEATURE					
		0 - 100 METERS		100 - 300 METERS		> 300 METERS	
		Ch/B(a)A/cPAH/nPAH/NAP (PPM)	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**
SAND	4.5	15/0.15/0.3/3.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	5.5	15/0.15/0.3/8.0/2.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	7.5	15/0.15/0.3/10/2.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	10.5	15/0.15/0.3/10/4.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	13.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	16.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	23.5	15/0.15/0.3/10/5.0	50 or BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
		0 - 100 METERS		100 - 300 METERS		> 300 METERS	
		Ch/B(a)A/cPAH/nPAH/NAP (PPM)	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**
SILT	4.5	15/0.15/0.3/3.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	5.5	15/0.15/0.3/6.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	7.5	15/0.15/0.3/10/3.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/50/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	13.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/50/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	16.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/50/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	23.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/50/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
		0 - 100 METERS		100 - 300 METERS		> 300 METERS	
		Ch/B(a)A/cPAH/nPAH/NAP (PPM)	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**	**Ch/B(a)A/cPAH/nPAH/NAP (PPM)**	**LEAD (PPM)**
CLAY	4.5	15/0.15/0.3/3.0/1.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	5.5	15/0.15/0.3/8.0/2.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	7.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	10.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	13.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	16.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.
	23.5	15/0.15/0.3/10/5.0	50 OR BGRD.	15/0.15/0.3/20/10	50 OR BGRD.	15/0.15/0.3/100/50	50 OR BGRD.

PAH: Polynuclear Aromatic Hydrocarbons
Ch: Allowable level individually for Chrysene
B(a)A: Allowable level individually for Benzo(a)anthracene
cPAH: Allowable level individually for Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, and Ideno(1,2,3-cd)pyrene
nPAH: Allowable Level Individually for Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene.
NAP: Allowable Level Individually for Naphthalene
50 or BGRD: 50 Parts Per Million or Site-Specifically Established Background for Total Lead

SOIL TABLE 3

ALLOWABLE SOIL LEVELS IN EXCAVATED MATERIALS TO BE USED FOR UN-RESTRICTED OFF SITE PURPOSES

BTEX		
BENZENE	0.01	PPM
TOLUENE	0.7	PPM
ETHYLBENZENE	0.9	PPM
XYLENE	5.0	PPM
PAH		
Ch	15	PPM
B(a)A	0.15	PPM
cPAH	0.3	PPM
nPAH	3.0	PPM
NAP	1.0	PPM
Total Lead		
50 PPM or Established Background		

BTEX: Benzene, Toluene, Ethylbenzene, and Xylene(total)
PAH: Polynuclear Aromatic Hydrocarbons
Ch: Allowable level individually for Chrysene
B(a)A: Allowable level individually for Benzo(a)anthracene
cPAH: Allowable level individually for Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, and Ideno(1,2,3-cd)pyrene
nPAH: Allowable Level Individually for Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene.
NAP: Allowable Level Individually for Naphthalene
PPM: mg/kg - Part Per Million

NOTE: Refer to the October 1995 Underground Storage Tank System Closure Outline for details concerning analytical requirements and procedures for establishing background.

For allowable levels in groundwater, refer to the Groundwater Worksheet.

GROUNDWATER WORKSHEET

1.0 General

In situations where groundwater has been encountered and an assessment is necessary, the allowable levels in groundwater shall be established through an assessment of site-specific conditions as determined by a registered professional engineer or registered professional geologist.

2.0 Establishing Groundwater Cleanup Standards

2.1 Two tables, Groundwater Table I and Groundwater Table II (page 31), specify the allowable residual levels in groundwater for closure. A site-specific determination, based on the subsequent criteria, shall be made to establish the appropriate table to be used.

NOTE: All facilities shall meet the requirements of 401 KAR 5:031, the surface water standards, for environmentally sensitive features.

GROUNDWATER TABLE I

3.0 Groundwater Table I Criteria

3.1 Groundwater Table I shall be used if the following conditions exist:

- The facility is serviced by a public water supply, and groundwater is encountered at a depth of 3.0 meters (9.84 feet) or less from the ground surface; or

- Domestic use wells, springs, cisterns, or well head protection areas are located within a 300 meter (984 feet) radius from the tank pit.

GROUNDWATER TABLE II

4.0 Groundwater Table II Criteria

Groundwater Table II may be used if the following conditions in sections 4.1 or 4.2 exist:

4.1 The facility is serviced by a public water supply and;

- No domestic use wells, springs, cisterns, or well head protection areas are located within a 300 meter (984 feet) radius from the tank pit; and
- Groundwater has not been encountered at a depth of 3.0 meters (9.84 feet) or less from the ground surface.

4.2 The facility is not serviced by a public water supply and;

- No domestic use wells, springs, cisterns, or well head protection areas are located within a 300 meter (984 feet) radius from the tank pit; and
- The affected groundwater is not a current or potential source for domestic use. (See Section 4.3 below)

4.3 Groundwater shall not be considered a current or potential source for domestic use if any of the following conditions are verified:

- The affected groundwater zone yields less than 150 gallons per day as determined by a registered professional engineer or geologist using acceptable hydrological methodologies;
- Analysis of any affected groundwater indicates total dissolved solids (TDS) in excess of 10,000 ppm as per 40 CFR 136 method 160.2;
- An estimation based on relevant information/data (e.g. local pump tests and analysis of similar or same formations, published information, etc.) indicates that the yields of any affected groundwater can be reasonably expected to be less than 150 gallons per day, or that total dissolved solids (TDS) of any affected groundwater can be reasonably expected to exceed 10,000 ppm.

5.0 Public Notice Requirements With The Use Of Groundwater Table II

If a Classification Guide is submitted that indicates that the levels specified in Groundwater Table II are applicable according to the above criteria, and site-specific analysis of groundwater indicates that levels exceeding those specified in Groundwater Table I are present, a Public Notice indicating the intention to leave these levels of petroleum remaining in the groundwater, without plans to remediate, is required. This Public Notice shall be published one time in a newspaper having general circulation in the county where the facility is located. Submit one copy of an invoice and two copies of an affidavit of publication to the Division of Waste Management, Underground Storage Tank Branch within seven (7) days after publication. (See Figure A)

6.0 Application of Groundwater Tables I and II

6.1 In every case, Groundwater Table I levels shall be applied to groundwater at or beyond the Point of Compliance.

6.2 If Groundwater Table II levels are determined to be appropriate on site, and if groundwater levels above those specified in Groundwater Table I are present in encountered groundwater, a groundwater sample shall be collected at, or as close as possible to, the hydrogeologically downgradient Point of Compliance and analyzed to confirm that groundwater levels exceeding those specified in Groundwater Table I are not present.

7.0 Corrective Action Measures

If allowable groundwater levels are exceeded within or beyond the Point of Compliance, the following actions shall be taken:

- A Site Investigation shall be performed in accordance with 401 KAR 42:060; and
- A Corrective Action Plan shall be developed in accordance with 401 KAR 42:060.

FIGURE A

PUBLIC NOTICE

(Example)

Proposed Closure of Underground Storage Tanks

For _____

Facility Name

The Kentucky Natural Resources and Environmental Protection Cabinet's Division of Waste Management is proposing to approve the closure of petroleum underground storage tanks for Site/Facility Name located at Street Address, City/County. The tanks have been closed in place at/removed from the site. Name, the Owner/Operator, has submitted documents requesting permanent closure of the UST system at the facility. A Closure Assessment Report and Closure Classification Guide have been completed. Petroleum hydrocarbon levels in the soil and groundwater are below allowable levels for a Class Class number, Class III Table or Class IV Matrix Table, Groundwater Table for the site according to the Underground Storage Tank System Facility Classification Outline in 401 KAR 42:080. The Cabinet proposes to accept the hydrocarbon levels that remain in the groundwater. This tentative decision is based on a thorough review of site conditions and regulatory requirements.

Copies of reports and related documents are available at the Division of Waste Management's Frankfort office. To review the documents, contact the UST Records Custodian at 1-800-928-4273 or (502) 564-6716, ext. 647. Hearing- and speech-impaired persons can contact the agency by using the Kentucky Relay Service, a toll-free telecommunication device for the deaf (TDD). For voice to TDD, call 1-800-648-6057. For TDD to voice, call 1-800-648-6056. Upon request, the documents can be provided in alternative formats to individuals with disabilities.

Anyone wishing to comment on the Cabinet's tentative decision, must do so by Date (30 days from date of publication), the close of the 30-day public comment period. Comments should be submitted to the Division of Waste Management, Underground Storage Tank Branch, 14 Reilly Road, Frankfort, KY 40601.

GROUNDWATER TABLE I
ALLOWABLE GROUNDWATER LEVELS

BTEX		
BENZENE	0.005	PPM
TOLUENE	1.0	PPM
ETHYLBENZENE	0.7	PPM
XYLENE	10.0	PPM
PAH		
cPAH:	0.005	PPM
nPAH:	3.0	PPM
NAPHTHALENE:	0.3	PPM
Total Lead		
0.015 PPM or Established Background		

GROUNDWATER TABLE II
ALLOWABLE GROUNDWATER LEVELS

BTEX		
BENZENE	0.4	PPM
TOLUENE	9.4	PPM
ETHYLBENZENE	2.4	PPM
XYLENE	10.0	PPM
PAH		
cPAH:	0.005	PPM
nPAH:	3.0	PPM
NAPHTHALENE:	0.3	PPM
Total Lead		
0.015 PPM or Established Background		

BTEX: Benzene, Toluene, Ethylbenzene, and Xylene(total)

PAH: Polynuclear Aromatic Hydrocarbons

cPAH: Allowable Level Individually for Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Ideno(1,2,3-cd)pyrene

nPAH: Allowable Level Individually for Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene.

PPM: mg/L - Part Per Million

NOTE: Refer to the October 1995 Underground Storage Tank System Closure Outline for details concerning analytical requirements and procedures for establishing background.